

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/26132

A. CLASSIFICATION OF SUBJECT MATTER IPC(7) : F16F 9/38; F16L 57/00 US CL : 188/322.12; 267/64.11; 118/505 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 188/322.12,382; 267/64.11; 118/505,504; 16/66,67,68; 383/70,71,77,84,85,88; 206/315.1,811 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) USPTO, PGPUB, USOCR, EPO, JPO, DERWENT		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y --- A	US 3,042,796 A (De FOREST) 03 July 1962 (03.07.1962), figure 1, column 2 lines 20-29.	1 and 4 ----- 5 and 8
Y --- A	US 3,850,141 A (SCHMITT) 26 November 1974 (26.11.1974), whole document.	1-4 ----- 5-8
Y --- A	US 4,591,137 A (STEINBERG) 27 May 1986 (27.05.1986), whole document.	1-4 ----- 5-8
Y --- A	US 5,074,390 A (FUHRMANN et al) 24 December 1991 (24.12.1991), whole document.	1-4 ----- 5-8
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search 05 May 2005 (05.05.2005)		Date of mailing of the international search report 17 JUN 2005
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230		Authorized officer Thomas J. Williams Telephone No. 571-272-6584

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/26132

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y --- A	US 6,334,711 B1 (RISGALLA et al) 01 January 2002 (01.01.2002), column 3 lines 63-66.	2 and 3 ----- 6 and 7
Y --- A	FR 2636404 A (BUISSON) 16 March 1990 (16.03.1990), abstract and figures 7 and 17.	1 and 4 ----- 5 and 8
A	US 4,372,429 A (MARX) 08 February 1983 (08.02.1983).	1-8
A	US 4,921,028 A (SCHWARTZ) 01 May 1990 (01.05.1990).	1-8
A	US 5,791,445 A (KAUFMANN et al) 11 August 1998 (11.08.1998).	1-8